A STUDY IN THE TESTING AND IN THE GRADING OF FARM MECHANICS WORK IN VOCATIONAL AGRICULTURE SCHOOLS

by

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INTRODUCTION AND PURPOSE

The most critical relation existing between teacher and pupil is, perhaps, that pertaining to grades. In some instances that relation is favorable, but in many cases it descends to a state of deplorability. At best there is always some apprehension on the part of the pupil and misgiving on the part of the teacher when grades have to be made up and recorded.

A teacher may attempt to explain to a pupil that a low grade should be an incentive to greater efforts and loftier

motives, or use other means to alleviate an embarrassing situation, but so seldom or never entirely removes the sense of bitterness and disappointment from the heart of the pupil. That such bitterness and disappointment should not exist is common knowledge, but that they need not occur is quite another angle.

This most undesirable condition is largely a result of misunderstanding on the part of the pupil and lack of definite objective grading standards on the part of the teacher. It is beyond our hopes to be able, as long as subjective qualities help to determine grades, and as long as grades continue to receive emphasis in our schools, to make every pupil entirely satisfied. But as pupils' work must be graded, even though the grading be subjective, and grades are not likely in the near future to receive less emphasis, one must turn to methods of improvement. Therefore, it is the purpose of this study to suggest a plan based on a survey of sixty vocational agriculture departments in high schools which will, in a limited measure at least, remedy the situation.

The hope of good from the plan extends in two directions. First, it should make the grading more nearly objective--a thing which should give the teacher greater confidence in the correctness of his grades. By having a

standard basis from which to work the teacher will be able to grade more consistently and fairly. Second, the pupil by understanding and having a part in the system by which his grades are made up will be able to know his own standing and see immediate results from his efforts. The plan herein proposed should help to remove much of "the hidden mystery to the students", to which Plank (1927, p. 3) refers and names as a major cause contributing to the dissatisfaction with present grading systems.

What has been said thus far concerning grading applies to any school subject matter. This study and suggested plan, however, deals only with farm mechanics as taught in vocational agriculture schools. Plank gives a commendable discussion of this field under the title of what he chooses to call "the point system of grading". But whereas he dealt chiefly with advantages and disadvantages of the point system together with distribution of grades within the group, this study deals with methods of making up the grades of the individual. Plank tells what to do with "points" once they are allotted; this study deals with <u>how to allot</u> the "points".

An attempt is made here to study not only grading but current practices that are related to making up the grades of pupils, such as, testing, teaching aids, proportioning

of subject matter, etc. These phases are inherently a part of any grading system, and can scarcely be omitted.

METHODS AND PROCEDURE

Material for this study comes from three principal sources; namely, a questionnaire, many formal and informal discussions by teachers, and the personal experience of the writer.

The questionnaire was sent to one hundred teachers of vocational agriculture selected, through the cooperation of state supervisors, as being experienced and particularly interested in the teaching of farm mechanics. Fifty of these were Kansas teachers, and fifty were teachers in other states. The "other states" were selected on the basis of their particular vocational agriculture and farm mechanics programs. Three to four questionnaires were sent to each of fourteen states other than Kansas.

The writer has not only tried out a number of methods and schemes for testing and grading farm mechanics work, but he has had numerous opportunities to secure the viewpoints of others. Formal discussions at vocational agriculture teachers' conferences and informal contacts with such teachers have been a rich source of information regarding

experiences, opinions, and reactions to various phases of testing and grading farm mechanics work.

The results of this study are presented in three more or less logical portions. The first two of these deal with present general practices regarding use of tests and various methods of making up pupils' grades. The third part pertains to the so-called "point system" of grading. In presenting and discussing this material it is hoped that some of the purposes and ideals of grading may be pointed out, and that better relationships among teacher and pupils will result. Information summarized in Tables IV and V should help to standardize the relative values, so far as grading is concerned, of the different enterprises and among a group of typical jobs, exercises and projects.

Of the one hundred questionnaires mailed during December 1932, sixty were answered and returned. Kansas teachers returned thirty-one or sixty-two per cent of questionnaires sent to them, and teachers of the other states returned twenty-nine or fifty-eight per cent. As is true of many surveys of this type not every teacher answered all of the questions, and a number of mistakes and misinterpretations are evident. In so far as possible all answers that were evasive or clearly incorrect were discarded. Due to the fact that the "point system" of

grading is not extensively used, the response to that portion of the questionnaire was limited. About three-fourths of the answers were from Kansas teachers.

FINDINGS

Part I

Administration of Tests

It is sometimes stated that farm mechanics, on account of the very nature of the subject matter and the wide diversity of jobs undertaken, is very difficult to test. This, if true, is unfortunate, because testing has become an established procedure in education and is probably the most reliable device now employed to measure progress and abilities. Schmidt, Ross, and Sharp (1927, p. 237) state that, "All school work must be measured and apparent results graded." It is not unlikely that the difficulty lies as much in the tests and in the organized program for teaching farm mechanics as elsewhere.

Through the use of the questionnaire the attempt was made to find the extent to which tests are employed, together with types of tests used and the time they are given. Answers indicate that a few teachers make no

attempt to test farm mechanics work, but base their grades entirely upon daily performance. Others have a regular system of giving individual tests each day, and still others test irregularly. A summary of fifty-five answers shows that:

11, or 20% use a regular, systematic plan for testing all of the work.

29, or 53% use a regular, systematic plan for testing part of the work.

15, or 27% test irregularly or not at all.

When it is considered that in most shops several types and kinds of farm mechanics work are being carried on at a given time it is not surprising that a large per cent of the testing is irregular or over only a part of the work. The testing schedule should, no doubt, depend upon the organization plan of teaching farm mechanics. If the work is not divided into enterprises, or blocks, the testing as well as the teaching is likely to be haphazard. When it is divided into enterprises, as is often done, very few schools have sufficient equipment to allow the whole class to be working on the same enterprise simultaneously. Under this circumstance it is evident that tests can be given more conveniently to individuals or small groups than to a class as a whole. It also becomes evident that small unit tests rather than general tests will fit the situation

better.

And apparently the tendency is in this direction, as shown not only by a study of Table I but by comparison of the number giving separate or unit tests for each enterprise, such as concrete, blacksmithing, etc., with the number giving composite or general tests. Thus as reported:

24, or 41% give separate tests for each enterprise.

34, or 59% give composite tests.

Such a tendency means, of course, shorter and more frequent tests. This is in accordance with views of many educators. As teachers build, or are able to secure more of these unit tests and organize their farm mechanics courses into enterprises as teaching units, their testing will become more systematic.

Vocational agriculture teachers who adhere to a testing program are not inclined to allow exemptions. Of forty-six reporting on this question

9, or 20% allow some exemptions.

37, or 80% allow no exemptions.

The student who makes a predetermined high grade, or one who has shown initiative and done superior work in class or at home is most often exempt from examinations. A few teachers base their exemptions upon attitude or the performance of extra, unassigned work.

If the only purpose of a test were to measure the ability of the student, the one whose standing is already high, perhaps, should be excused from taking examinations. But considering that tests make excellent reviews and are a definite stimulus in causing the student to do a higher grade of work, there is no real grounds for exempting those who are superior. In fact, the good student will almost without exception, simply because of his superior ability, gain more than the poor student from tests. Furthermore, to remove the uppermost students from competition throws the remainder of the class out of balance in so far as average ability is concerned. The fact that eighty per cent of the teachers do not allow exemptions suggests that there are fairly good reasons for requiring all members of a class to take tests. This statement is more significant when it is observed that several of the exemptions are from semester final examinations only.

Further study considering the time when tests are given is summarized in Table I. In this survey teachers were asked to check the time at which they gave tests in each of twenty enterprises ordinarily composing the farm mechanics course. (The number of answers does not agree with the number of teachers checking because several checked the same enterprise in two or more columns. For instance,

Table I

Showing Preference as to Time of Giving Tests in Farm Mechanics Work as Indicated by Fifty-five Teachers

Enterprises	Tests Are Given					
	Each Week	Each Six Weeks	At Close of Semester	As Final at End of Year	As Soon as a Job or Project is Finished	As Soon as an Enterprise is Finished
1. Rope work	6	12	10	5	19	19
2. Woodwork or carpentry	5	18	18	5	14	11
3. Blacksmithing	2	12	12	5	10	11
4. Blueprint reading or drawing	2	10	8	2	7	6
5. Glazing	2	9	8	2	15	6
6. Care and use of tools	4	20	17	5	10	13
7. Sheet metal and soldering	2	14	11	4	15	15
8. Cold iron work	2	11	8	2	12	7
9. Harness and leather work	2	9	8	2	14	10
10. Auto and tractor work	5	9	9	5	10	12

Table I (Con't)

11. Gas engines	4	11	8	3	8	14
12. Electricity and appliances	5	10	7	3	6	10
13. Babbitting	2	7	5	1	3	4
14. Concrete work	2	15	11	3	15	21
15. Farm machinery	3	16	11	2	14	17
16. Farm engineering—terracing, etc.	3	10	8	2	9	11
17. Mechanical advantages, hitches, etc.	2	8	6	5	7	14
18. Paints and painting	2	12	9	5	12	13
19. Equipping the home shop	3	11	7	5	8	11
20. Plumbing	2	7	5	3	7	11
Totals	54	255	186	63	217	256

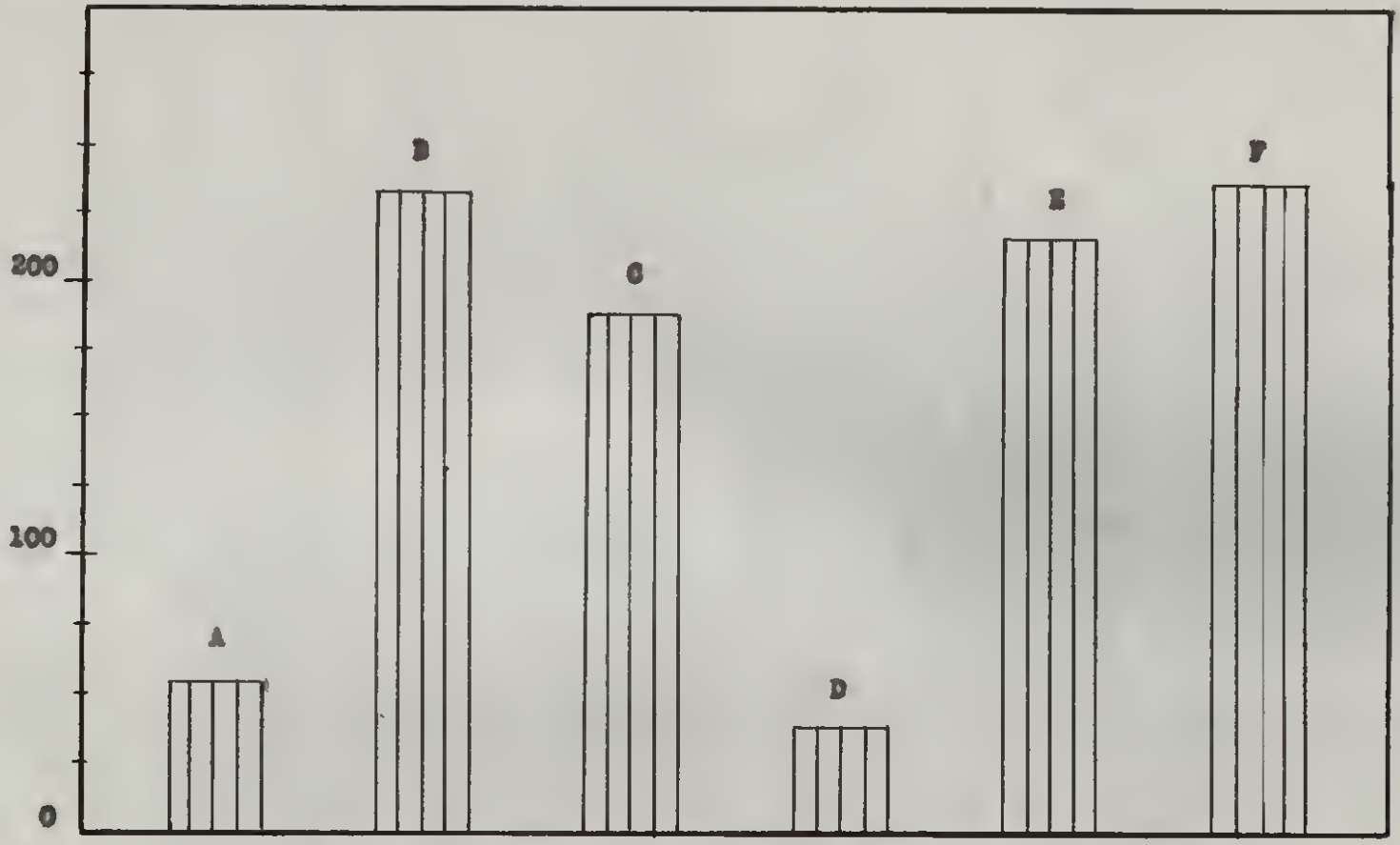

Figure 1. Graph showing comparison of preferences in time of testing farm mechanics, indicated by fifty-five teachers

A - Each week - 54
B - Each six-weeks - 255
C - Close of semester - 186
D - Final at end of year - 63
E - As soon as job or project is finished - 217
F - As soon as enterprise is complete - 236

a teacher may have checked in column six as well as in column two. This is significant in interpreting results because six-weeks and semester tests are often repetitions of those tests checked under columns six and seven.

Two generalizations may be made from Table I. In the first place, a very large part of the testing is done immediately after the job, exercise, or project is finished or on completion of an enterprise. Although of a total of 989 checks 233 are for "Each Six Weeks" and 186 are for "At Close of Semester", there are 217 checks for "As Soon as the Job is Finished" and 236 for "As Soon as the Enterprise is Finished". Figure 1 shows this graphically. This represents that a total of forty-two per cent are for tests at the regular school testing periods as against a total of forty-six per cent for tests immediately or closely following the job or unit of related work. Occasionally, of course, the end of a six-weeks period will coincide with the closing of an enterprise or job, but it is the exception rather than the rule. It is more often the case that tests are given at six-weeks and semester periods because of the customary school schedule. These tests often are repetitions of tests previously given over jobs or units. These conclusions would seem to indicate that most teachers consider it very good practice to test the jobs and projects

and more especially the enterprises as soon as they are finished.

The second generalization is that certain enterprises more readily lend themselves to testing as units than do others. For Rope work, Harness and leather, Soldering and sheet metal, Gas engines, Concrete work, Mechanical advantages, etc., the choice of testing "As Soon as the Enterprise is Finished" is given 1.37 times as often as testing "Each Six Weeks" and 1.75 times as often as testing "At Close of Semester", while the choice for tests of the other enterprises is more often given as "At Close of Semester" or "Each Six Weeks". Most of those named above form a group of enterprises which are often taught as isolated units, while the others are broken up and distributed over longer periods. That is, enterprises like Concrete and Rope work may easily be taught to a whole class at one time with possibly no need of returning to the subject during the remainder of the year, while a boy or a group may have occasion to work in the enterprise of Carpentry a number of different times during the year. Consequently the time at which tests could best be given would be affected as shown.

It seems that to divide farm mechanics into enterprises or similar units would not only assist in making

testing easier and more systematic, but would contribute to a more efficient teaching organization.

Preferences in Tests. Whether testing is done at the finish of an enterprise, at the six-weeks period, or at some other time the type of test best suited to farm mechanics in general and to each enterprise in particular is of considerable importance. There has been enough experimentation in fields of general education to show that certain of the objective-type tests are more reliable than others, and that a given type may be better suited to testing certain subject matter or abilities than others.

Through the questionnaire teachers were asked to check their first, second, and third choices of the six types of tests listed in Table II which they considered best adapted to each of the twenty enterprises. Table II shows a summary of their respective rankings, which is indicated by the numbers following each enterprise. For example, it shows that for Rope work the Performance Test (by which is meant the actual doing of a piece of work) ranks first, the Completion Test ranks second, and the Discussion Test ranks third. (To secure a composite ranking the individual teacher's rankings were scored as follows: when a test was checked as ranking first it was scored three points, if it was ranked as second, two points, and if third, one point.

Table II

Summary of Rankings of Six "Best Type" of Tests for Farm Mechanics as Indicated by Fifty-seven Teachers of Vocational Agriculture

Enterprises	Types of Tests											
	True-False		Multiple Choice		Completion		Matching		Discussion		Performance	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Rope work	17	5	31	4	71	2	5	6	32	3	145	1
Woodwork or carpentry	19	5	32	4	77	2	8	6	37	3	125	1
Blacksmithing	17	5	22	4	50	2	7	6	30	3	106	1
Blueprint reading or drawing	17	3	20	4	43	2	7	6	34	3	96	1
Glazing	12	5	20	4	47	2	7	6	32	3	92	1
Care and use of tools	31	4	27	5	65	2	9	6	31	3	115	1
Sheet metal and soldering	27	4	25	5	61	2	8	6	37	3	104	1
Cold iron work	17	5	21	4	46	2	4	6	28	3	92	1
Harness and leather work	16	5	20	4	62	2	4	6	48	3	99	1
Auto and tractor mechanics	26	4	25	5	62	2	8	6	37	3	67	1

Table II (Con't)

Gas engines	22	5	26	4	49	2	8	6	36	3	74	1
Electricity and appliances	19	5	24	4	43	2	6	6	36	3	54	1
Babbitting	13	4-5	13	4-5	38	2	5	6	26	3	39	1
Plumbing	11	5	22	4	46	2	7	6	32	3	51	1
Concrete work	21	5	26	4	65	2	8	6	49	3	68	1
Paints and painting	28	5	39	4	76	2	8	6	49	3	70	2
Farm machinery	25	5	35	4	68	2	5	6	57	3	74	1
Farm engineering, terracing, etc.	15	5	37	4	48	2	4	6	44	3	54	1
Machine hitches, pulleys, etc.	18	5	30	4	57	2	7	6	47	3	64	1
Equipping the home shop	13	5	25	4	51	3	5	6	55	2	89	1
Total scores	382		520		1129		130		779		1708	4648

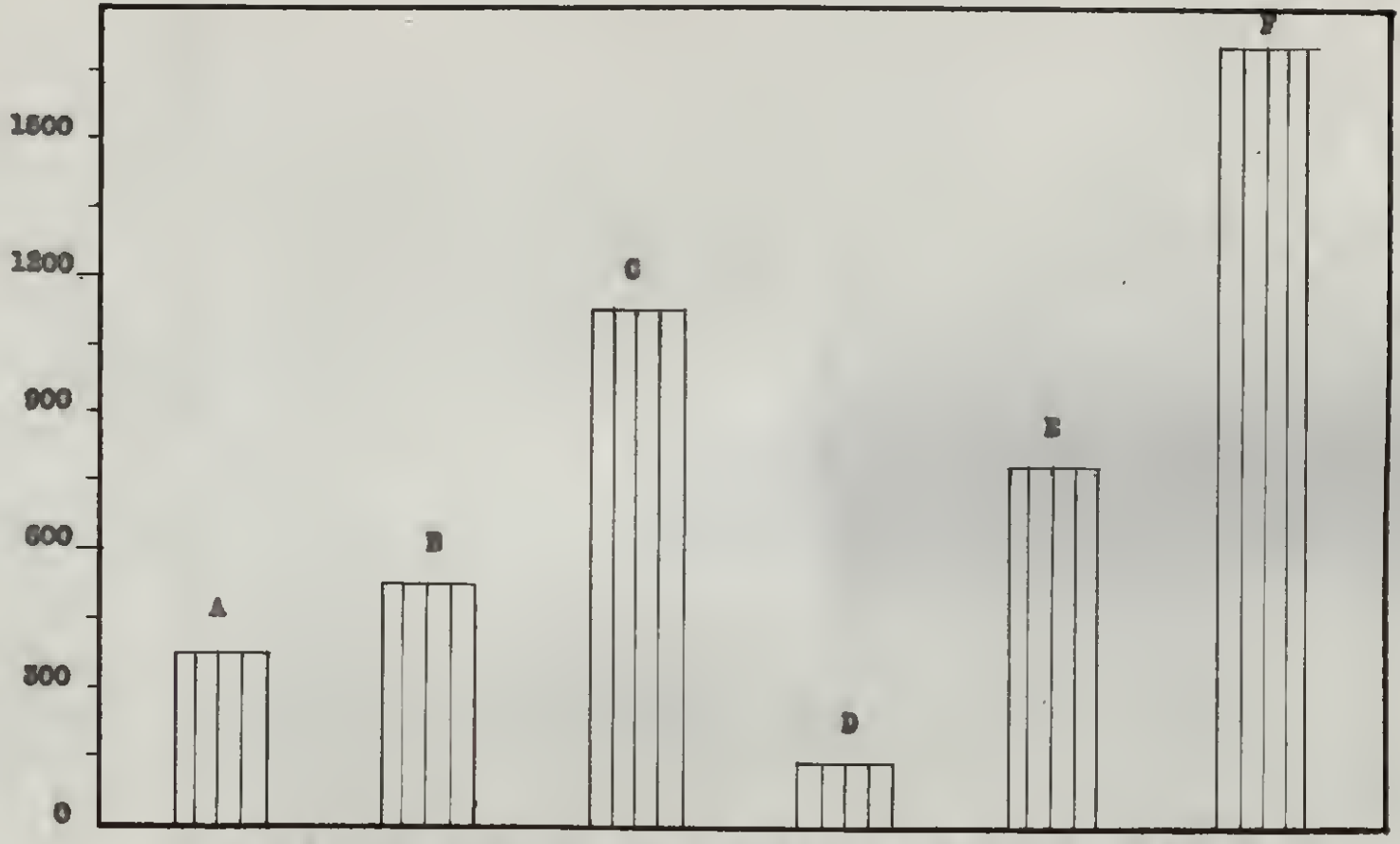

Figure 2. Graph of the rankings by total scores of six "best types" of tests for farm mechanics as indicated by fifty-seven teachers of vocational agriculture. (See Table II)

A - True-false - 562
B - Multiple Choice - 820
C - Completion - 1129
D - Matching - 130
E - Discussion - 779
F - Performance - 1708

Scores for each test in each enterprise were then added, and tests ranked in order of their total scores.)

The ranks of the tests are strikingly uniform. In all enterprises, except Paints and painting, Performance Test is given first place. Completion Test is placed second, eighteen out of twenty times, and Discussion is third in nineteen of the twenty enterprises. The others in order are Multiple Choice, True-false, and Matching. These rankings are shown graphically in Figure 2.

It should be noted that the ranking may or may not be an indication that the six types of tests take this order in reliability. It is merely the order of arrangement of what the group of vocational agriculture teachers consider their "Best Test", whose judgment in most cases is based, no doubt, upon experience, available material, etc., rather than upon scientific study. Experiments and rather extensive studies by students of educational measurements give the following ranking of reliability of tests in general education:

Completion - (Recall) - First.

Multiple Choice and Matching - (Recognition) - Second.

True-false - (Alternative) - Third.

However, it is altogether possible that they should rank in a different order when used as tests for farm mechanics.

According to opinions drawn from Ruch (1927, p. 281) there is less difference among the types of tests than the rankings by vocational agriculture teachers would indicate.

There is little doubt but that a test of actual performance is one of the best means of measuring certain qualities, provided the work can be scored or graded objectively. This is especially true of testing skills and ability to perform manual jobs where the accuracy can be determined by measurement, or where, as in tying rope knots, the work is either objectively correct or incorrect. However, this fact should not be lost sight of--certain related information, attitudes, and mental abilities are of as great as or even greater importance than manual skill, and these are not always measured accurately by performance tests. The performance test involves action and is intensely interesting, and from the popular viewpoint of pupils and parents is a yardstick of real progress and achievement, and without doubt, should be used extensively, but in order to secure a more accurate check upon those related qualities which are considered essential to a well-rounded training in farm mechanics, it should be supplemented with objective tests of the completion and multiple choice type.

Administrative Procedure. The testing program for

farm mechanics now in force among this group of teachers is noticeably irregular and, apparently, is somewhat weak, varying as it does from testing every day in some schools to no testing at all in others. Inasmuch as there is not now nor is there soon likely to be a satisfactory substitute for students' grades, teachers are ever confronted with the problem of making them up. Because of this fact and the fact that testing is excellent review and a strong stimulus to greater effort on the part of the student, no teacher's organization is complete without a more or less definite testing program. Just what part tests should play in making up the grade is discussed later, but grades can scarcely be determined fairly and accurately without tests. An essential thing is to use tests that are adapted and reliable, and to give most of them at or near the close of units of work. The most suitable plan is to use a variety of types. Even in the same examination satisfactory results are obtained by mixing together indiscriminately the various types of tests.

Part II

Grading

A summary of grading practices now employed by teachers of farm mechanics work should aid in the selection and adoption of those methods which are most practical and sound. There is wide variation in the manner in which teachers of vocational agriculture make up, distribute, and use grades of pupils.

Grade Distribution. It would not be extreme exaggeration to say that there are almost as many grading systems as there are schools, although the majority, when analyzed, fall into two main classes. According to Ruch (1927, p. 369) a survey of 281 schools in Illinois shows that about two-thirds of them use the normal curve and one-third use the 100 per cent system for distributing grades. Reports from fifty-five schools having departments of vocational agriculture indicate that:

9, or 16% distribute grades according to the normal curve.

35, or 64% use the normal curve with deviations.

11, or 20% use miscellaneous methods.

The same survey shows that three-fourths of the vocational agriculture teachers use the same system of grading as is used in their school, while one-fourth use a different system. Various teachers reported the following miscellaneous methods of grading:

> On students' merits; no arbitrary plan.
> No plan; grades not distributed.
> Average of C; other grades based on C.
> Left to teacher.
> Accumulation of points regardless of curve.
> Standard of performance.

The use of the "normal curve with deviations", as used by sixty-four per cent of the schools, is probably most nearly in keeping with up-to-date ideas of scientific grading. The standard normal curve is too rigid to apply in small classes. Ruch makes a number of recommendations in the form of slight departures from the normal curve system. "The real basis of grading," Plank (1927, p. 11) aptly states, "is comparison of the students." Where standard tests are used and achievements of large numbers of students are known grades may be distributed with a great deal of consistency, but these are not available for and probably are not adapted to farm mechanics work. To drop the use of the normal curve entirely is as incorrect as to adhere to it too rigidly. The best plan seems to be to apply it to distribution of grades, but to make allowances for size of

class, ability of the group, local conditions, and other factors which may keep the class from being quite "normal".

Recording and Using the Grade. It is generally understood, in Kansas at least, that students do not receive credit in vocational agriculture without doing satisfactory work in both farm mechanics and crops or livestock production, and according to the state plan, one grade only should be recorded for both. Since two-fifths or more of the time is spent in the shop and there is a tendency to look upon them, from the standpoint of organization and subject matter, as two separate units, a number of teachers find it more convenient to grade them as such and give one grade for farm mechanics and another for the production work. When teachers were questioned on this point it was found that:

32, or 53% give combined grades.

28, or 47% give separate grades,

a few of those giving combined grades reporting that separate grades were made out, but for final recording the two were combined.

Teachers were also questioned about their use of the State Record, or Grade Book (Hall, 1928, 52 p.) which has been adopted in Kansas as well as in a number of other

states. Of forty-eight reporting:

25, or 56% use the plan.

21, or 44% do not.

Remarks made by a few answering the question indicate that they think the plan goes too much into detail and is not necessary in a small class.

Keeping in mind that such a procedure might not be in accordance with the Federal plan for Vocational Education there are some good reasons for separating the two grades. One comes from the athletic coach. The high school athletic association rules usually permit a student to fail in one of his usual four subjects and still remain eligible to compete in athletics. Therefore, it is found that fewer players become "ineligible" when vocational agriculture is treated as two subjects.

Another reason for making up two grades is that students are kept better informed as to the quality of their work. It is maintained, no doubt justly so, that two credits is too large a section of high school work to cover with one grade, whereas to consider farm mechanics and the production work distinct subjects, for grading purposes, enables the boy to know his rating in each of these two sections.

Comments by teachers indicate that the majority who

give one grade only inform their students of their standing in farm mechanics by using a wall chart or by oral announcements. A considerable number depend upon the student to ask about his grade, while a few say that students do not find out. Grades on jobs, projects, tests, daily work, etc. would furnish the student some information about the quality of his work, but would not tell him his rank in the class. None of these methods satisfactorily inform parents of the boys' grades. To many parents farm mechanics is the pride and backbone of the vocational agriculture course. They expect to and should be regularly informed as to their boys' standing in the work. The only means thus far suggested which will keep both student and parents posted is to make up separate grades for farm mechanics and the production work and report them on the monthly or six-weeks report cards, even though they may later be combined for the permanent school record.

In addition to regular report cards other methods of informing parents of students' rating, which likewise usually serve as notices to students themselves, are given below:

Three interviews with parents per year.
Weekly notices of failing students.
Occasional mimeographed letters.
Quarterly notices by director.

Notice each three weeks when student is low.
Letters to parents when students are far above or below average.
Three highest and three lowest in each subject published in local paper.
Discuss with parents at time of project visits.

Weekly notices of failing students and letters to parents when students are far above or below average are among the better schemes for the poor students, but reporting names of three highest and three lowest in the local paper can scarcely be called legitimate use of grades. To that large in-between group--the average students--not much attention is given. It might appear that the attitude of the school is that average work, and not development of each student to his highest capabilities, is all that is expected. Interest and encouragement expressed through "Three interviews per year" or "Discussions at time of project visit", etc. certainly have greater possibilities with the "middle" group than some other devices have with the failing students.

Tests Versus Performance. In attempting to determine the proportionate emphasis placed upon tests and upon performance in making up students' grades in farm mechanics the teachers were asked, "What per cent of the grade is for periodical tests and what per cent is for daily performance?" Fifty-two reported as follows:

3, or 6% grade 50% on tests and 50% on daily performance.

6, or 12% grade 33 1/3% on tests and 66 2/3% on daily performance.

29, or 56% grade 25% on tests and 75% on daily performance.

12, or 23% grade 20%, or less, on tests.

2, or 4% have no fixed ratio.

Most teachers prefer to count tests 25% and daily performance 75% as grading factors. Investigators in the field of testing are not convinced that even the objective type of tests adequately measure a majority of the qualities and abilities of a student. Certainly they do, however, measure some of them, and scoring of tests is more accurate than scoring daily work. Therefore, it seems that test scores, properly taken, should be responsible for at least 25% of the students period or semester grade.

Teaching Aids. Score cards, job instruction sheets, students' work-plan cards, etc. for farm mechanics have a number of merits. They are discussed here principally from the standpoint of grading. It appears that no teacher uses them in all shop jobs and projects, but more than three-fifths of the teachers use them to some extent. The survey shows that:

6, or 11% use score cards.

47, or 89% do not.

32, or 60% use instruction sheets.

21, or 40% do not.

32, or 60% use student work-plan cards.

21, or 40% do not.

The use of some kind of work-plan or instruction card not only provides a means of immediate grading of each piece of work, but enables the student to know the grade value of the job as soon as it is finished, inasmuch as the grade can be recorded on the card. In many cases the student helps to decide upon his own grade. When he knows the basis of grading and learns to evaluate his own work he has made genuine progress. Experience shows that students can learn to help evaluate their own efforts, and take an interest in doing so. Because of this factor the use of such teaching aids may become a valuable motivating agent.

Seventy-two per cent of the teachers employing these aids report that they use the card for recording the grade of the job or project as soon as it is finished. The card for each job or project may then be filed. Unless a better plan can be found to tie up the grading with the performance of the work teachers who fail to indicate marks on the cards

are omitting an important factor in instruction. A few teachers use this opportunity to evaluate the job of planning and estimating even before the operative jobs are begun.

In addition to those mentioned above a number of advantages and disadvantages of the use of written teaching aids were reported. The most important of these are listed below.

Advantages:

Saves time.
Causes boys to get details.
Fair grading to pupil, on quality and quantity.
Helps teacher keep record of grades and jobs actually done by each boy.
Mistakes can be avoided.
Teaches students value of planning.
Keeps grade book out of shop.
Acts in discipline.
Makes boys responsible for keeping records of their own.
Creates definite understanding between teacher and pupil.
Less confusion to pupil and teacher.
Creates better work spirit.

Disadvantages:

Job sheets leave student less self-reliant.
Sheets usually are not illustrated.
Boys dislike; tends to lessen interest in job.
Takes up shop time.
Time spent in planning, estimating, and recording discourages pupil in course.
Hard to keep job sheets in good shape.

One of the most pertinent disadvantages listed is that too much time spent in planning, estimating, and recording discourages the pupil. However much benefit is derived from planning and estimating, it should not be carried to the point where it becomes drudgery and destroys interest. To abuse the use of instruction sheets and plan cards will quickly defeat their purpose. There is a very wide variety of such sheets (Hauk, 1930, p. 15-23), many of which are entirely too complicated and many of which are so short and elementary that they are worthless.

Part III

The Point System

Explanation. The point system is a method by which points, in varying quantities, are used to evaluate a piece of work. When a student performs a certain task he is given "points" in proportion to what the instructor considers the work worth. As the students work each one accumulates "points". "Points" are not grades, but they are used in determining grades. Naturally, the one who "earns" the greatest number of points will be entitled to the highest grade.

It is not the purpose of this study to enter into

discussion of the merits of the point system, although a considerable amount of information is presented in its defense. Plank, in "The Use of the School Mark", has discussed the system as a method of distributing grades, and numerous articles have appeared in current literature (Schmutz and Adams, 1932), (McPhee, 1932), concerning various phases of its use. The object here is to sort from the information collected in the survey the best practices and to help crystallize a usable plan of allotting points.

The use of the system necessitates forethought and preparation. Some scheme must be devised for keeping the record of each student. Also, it is necessary to decide upon the relative point-value of each piece of work. It is designed to provide a more convenient and equitable method of considering time and quantity and quality of work in making up the grade. Each student by comparing the total of his points with that of other members of the class is able at any time to see his relative standing in the class. He is thereby placed more upon his own initiative, because it is to his interest to work better or faster in order to earn more points.

Inquiry was made, through the questionnaire, as to the

extent to which the point system is now used in farm mechanics grading. Of fifty-seven teachers reporting:

33, or 58% do not use a point system.

18, or 32% use it wholly.

7, or 12% use it in part of their work.

5, or 9% once used it, but discontinued.

In support of the point system, users of it stated that it enables the pupil to know at all times just where he stands with respect to requirements and to the rest of the class, and that grades are kept more accurately. The system seems particularly adapted to keeping records where the jobs, projects, and enterprises vary in nature, size, and difficulty, as they do in farm mechanics. According to Plank (1927, p. 38) results of tests in Winfield, Kansas, High School show that the class graded by the point system was more active and made more progress than the class graded by the old method.

Chief of the disadvantages listed by users as well as those who have discontinued the point system is that it is impossible or very difficult to distribute the points in a satisfactory proportion. However, this is no more the case with the point system than with the letter or per cent system. It may be easier to decide between a C or a B grade, but it is less accurate as a true measure of

students' accomplishments. A few teachers believe that a point system tends to limit the range of choice of projects and causes the boy to hesitate to attack out-of-the-ordinary jobs because of fear that fewer points will be earned. However, eighty-two per cent reported that this does not occur. The same number admit that students, by a judicious choice of projects or jobs, may gain an advantage in accumulating points, but say they have no serious objection to the practice. Still others maintain that the point system puts a premium on quantity of work and does not take into account skills, related information, and other less tangible abilities. Close study into methods and devices reveals that a half-way application of the system would foster all of these faults, but that a system with carefully worked out details reduces them to a minimum.

Scoring All Qualities. One of the most difficult things to accomplish through any grading system is to make the grade represent a measure of all the qualities which teachers desire pupils to learn. It is not enough to turn out so much work, or to finish a job in minimum time, or even to be skillful in the use of tools. Related information, ability to plan and estimate, fine appreciation, and many other factors are of paramount importance. It is these qualities that are most difficult to measure and

express in terms of a grade.

The point system is criticised for placing too much emphasis upon speed and quantity and failure to take into account the other desirable factors. However, is it not more probable that other grading systems place too little emphasis upon speed and quantity of work? By the ordinary methods an A is an A, whether it was earned in the construction of a first class bench hook or a first class farm wagon box. Aside from the fact that students are expected to "keep busy" there is no objective evidence that the grade expresses any difference in amounts of work performed. The precaution necessary is that the point system be not allowed to reward speed only. By no system can we measure other qualities as accurately as is desired, but the point system used in connection with work-plan cards and job-instruction sheets apparently goes further in this direction than do other methods. For information on this point teachers were asked, "Does your use of the point system take into account the following factors?" In Table III, which follows, are tabulated the factors and the answers.

Table III

Factors Measured by the Point System

Factors	Number Answering "No"	Per cent Answering "No"	Number Answering "Yes"	Per cent Answering "Yes"
Planning and estimating	3	13	20	87
Skill in handling tools	3	13	20	87
Accuracy in measuring, cutting, etc.	3	13	20	87
Time and rate of work	4	17	19	83
Knowledge of related information	8	33	12	67

When work-plan cards, or such aids, are used it is common practice to have spaces for checking them in such a way as to award points on each of these elements. If the plan is not too elaborate the checking can be done in a very short time. "Planning and estimating" is often marked before the project is complete, so that the pupil knows what he is to receive on this factor. Related information is usually accounted for in tests.

Basis for Points. The question of "On what basis" and "For what items" to award points has caused much confusion. For obvious reasons some foundation or starting place must be fixed. Most teachers are of the opinion that the average student should be able to earn up to approximately one

hundred points per week. This is high enough that points can be awarded for jobs that are quite small, and is low enough to prevent the accumulated points from running into cumbersome figures during a semester.

However, to place it entirely upon a point-per-hour basis destroys the whole value of the point system. The survey shows that:

1, or 4% allow a given number of points per hour.

8, or 30% give a predetermined number of points for each exercise, job, or project.

18, or 67% allow a variable number of points, depending upon workmanship, skills, etc.

It seems that the best plan is to establish the maximum number of points that may be earned in completing a piece of work, then vary the points allowed according to quality of workmanship. There are certain instances in which the factor of workmanship practically is lacking, in which case the established maximum number of points would be allowed.

A number of questions in the survey were designed to determine whether or not points are allowed for items that are considered not strictly farm mechanics practice. Numbers and percentages of answers are listed below.

12, or 52% give points for answers on tests.

4, or 20% give points for cleaning up the shop.

6, or 27% give points for checking tools.

13, or 57% allow points for home practice (in mechanics).

19, or 80% give points for miscellaneous repairs and odd jobs about school.

6, or 29% allow extra points for good behavior, cooperation, interest, etc.

5, or 25% deduct points for lack of good behavior, cooperation, etc.

The per cent of teachers allowing points on most of these items is, in the opinion of the writer, too low. Points should be allowed for all work done by the student. Checking tools, cleaning the shop, etc., from the standpoint of skills and time are unimportant, but giving points for them promotes the spirit of cooperation and good will among students and rewards them for commendable habits. In the absence of a better method it is satisfactory to allot them by the hour. The matter of discipline usually automatically accounts for itself. Students who waste time cannot earn as many points as others. Deleterious offenses probably do not properly belong among grading factors, but minor infractions are apparently handled satisfactorily by deduction of points or suspension from class.

When a job or project is once done, a student may find it to his advantage, in so far as points are concerned, to repeat it one or more times. Should this occur some

teachers allow no points while others allow full credit for each time the work is repeated. One of the most satisfactory solutions is to allow points for the operative jobs but not for the planning and estimating. Check upon repetitions is comparatively simple when individual work-plan cards are used and properly filed.

Recording the Points. It has already been stated that when individual work-plan cards are used the number of points earned for each piece of work should be written on the card. Eighty per cent of the teachers reporting do this, and a larger number keep an account in their record book, as well. However, many of the teachers find that if students are to receive full benefit from the point system they must have a convenient, continuous method of comparing their ranks. Fifteen out of seventeen, or 88%, report that for this purpose they use a wall chart, indicating on it the number of points earned by each student, and more than half of them have their students assist in keeping this record. When the plan for awarding points is thoroughly understood by the student and proper attitudes are built up about his grades, such a practice produces a wholesome influence upon the members of the class.

Allotting the Points. As stated in a previous paragraph a starting place, or foundation, for allotting points

must be established. This of necessity will be arbitrary. Aside from the fact that to handle fractions or very large numbers is inconvenient, the basis might be fixed at any point or on any unit of work. Once the basis is established the number of points for all other items will be relative.

The best basis, it seems, for awarding points is to be found in what teachers who use the point system have chosen to set up as their "minimum required number of points per year". Whether or not this amount is too high or too low depends upon how liberally points are given on individual pieces of work and upon the average ability of students. The use of the point system has not been uniform nor extensive enough in farm mechanics to determine standards of ability. Eighteen out of twenty-two teachers report that they set up such a minimum. The ranges are from about 500 to 3600 points, with a mean of about 2400 points per year. To take this as an arbitrary standard is probably as satisfactory as using any other quantity.

The next step is to proportion the points among the various enterprises so that each will receive its proper emphasis. Teachers of vocational agriculture more or less generally have for the sake of convenience in instruction and a balanced course separated farm mechanics into some twenty of these enterprises. Emphasis placed upon these

several enterprises depends upon which ones the instructor considers most important in his community. Pollom (1927, p. 14) found that farm mechanics teachers of Kansas spent 34% of their time on carpentry, 12.6% on blacksmithing, 10.7% on farm machinery, 4.7% on soldering and sheet metal, etc. Every teacher's program may differ in the time or emphasis he places upon each enterprise, but he will allot his "point requirements" in proportion.

Although only nine out of twenty-two teachers surveyed for this study set up these proportions and make minimum requirements in each enterprise, this procedure appears to be the most satisfactory means to insure the students receiving a well-rounded course and obtaining some practice in all enterprises. This is the purpose of enterprise minimums, and not to set up a required amount of work.

By means of the questionnaire teachers using the point system were asked to state the number of points they require students to earn in each of twenty enterprises. A summary of this information is presented in Table IV. Because the program of each teacher depends upon conditions in his local community the scale cannot be adopted as a whole, but the mean ratios may be a basis from which to work.

Table IV is made up from answers by eleven teachers. The first column contains a list of twenty enterprises.

Table IV

Mean Number of Points Set Up by Vocational Agriculture Teachers as Minimum Requirements in Each of Twenty Farm Mechanics Enterprises

Enterprise	Mean Number of Points Per Year	Ratio Expressing Relative Emphasis	Means Adjusted to Minimum of 1800 Points Per Year	Suggested Practical Scale
1. Rope work	76	1.31	36.4	35
2. Woodwork or carpentry	816	14.35	398.9	400
3. Blacksmithing	342	5.89	163.7	165
4. Blueprint reading and drawing	130	2.24	62.2	60
5. Glazing	58	1.00	26.8	25
6. Care and use of tools	204	3.51	97.5	100
7. Sheet metal and soldering	189	3.26	90.6	90
8. Cold iron work	160	2.76	76.7	75
9. Harness and leather work	162	2.77	77.0	75
10. Auto and tractor mechanics	254	2.61	72.5	75
11. Gas engines	195	3.36	93.4	95

Table IV (Con't)

12. Electricity and appliances	145	2.50	71.7	70
13. Babbitting	138	2.38	66.1	65
14. Concrete work	131	2.26	62.8	65
15. Farm machinery	334	6.05	104.8	105
16. Farm engineering--terracing, etc.	99	1.68	42.8	45
17. Mechanical advantages--hitches, pulleys, etc.	77	1.38	36.9	35
18. Paints and painting	58	1.00	27.8	30
19. Equipping the farm shop	150	2.59	72.0	70
20. Plumbing	84	1.45	40.3	40
Totals	3842	----	1800.	1800

In the second column is the mean number of points allotted to each enterprise. (It should be explained that the scale used by a few of the te chers was so far above or below the mean that they were "balanced" before being used in the table. This was done to prevent one teacher's scale from exercising undue influence on the ratio, inasmuch as it was ratios and not merely averages that were sought. The balancing was done by dividing or multiplying his entire scale through by a constant as two or five. The values were changed but not their ratios. Thus, the means obtained are somewhat approximate.) The ratios shown in the third column are obtained by dividing each mean by the lowest mean, which is fifty-eight. The fourth column is an adjusted schedule, which is obtained by multiplying each of the ratios by 27.8. The reason for using 27.8 as a multiplier is that it brings the total of points for enterprises to 1800, (3/4 of 2400), or the suggested 3/4 of the number of points required for the year. Numbers in the fifth column are the same as those in the fourth, except that they are changed to the nearest multiple of five, merely to simplify the use of the suggested schedule.

Allotting Points to Projects. In practical application of the point system the thing causing greatest concern is the allotting of points to the exercises, jobs,

and projects. One teacher might allow twice as many points for the construction of a wheelbarrow as for making a ladder, while under the same conditions another teacher would give four times as many points for the wheelbarrow. The latter maintains that building a wheelbarrow involves many more skills, takes more time, and has more difficult problems than making a ladder, and therefore, is worth a much greater number of points. Likewise, teachers are not agreed upon the relative value of other pieces of work. This lack of standards has brought some disfavor of the point system to students and teachers alike.

Table V shows results of a study into this matter. A list of forty-seven exercises, jobs, and projects was submitted to teachers with the request that they indicate the number of points allowed for each. Fourteen teachers submitted as answers the number they allow as maximums for superior work. From this data were calculated means, ratios, and a suggested schedule in the same manner as for allotting points among the enterprises (see page 41). The first column is the list of forty-seven exercises, jobs, and projects, and the second column shows the mean for each. The column headed "Relative Values" shows the relative values of these quantities expressed in lowest terms, obtained by dividing each one by fifteen (fifteen is the

Table V

Maximum Number of Points Allowed for Each of Forty-seven Exercises, Jobs, and Projects as Obtained from Survey Data

Project, Job, or Exercise	Mean Number of Points	Relative Values	Suggested Scale
Drawing for A-type hog house	85	5.67	85
Squaring up a block (exercise)	37	2.50	35
Saw horse	108	7.20	110
Ladder, 12'	113	7.53	115
Trap nests, battery of 10 nests	168	11.20	170
Hay rack	584	39.00	585
Farm wagon box (excluding irons)	694	46.26	700
Stanchion (wood)	184	12.27	185
Poultry house, modern, 16x24	2033	135.87	2000
Hog house, individual, A-type	543	36.20	545
Nail box (wood)	71	4.73	70
Fit a hammer handle	23	1.53	25

Table V (Con't)

Put in shovel handle	27	1.80	25
Hog feeder, 5 bushel capacity	227	15.13	225
Hog feeder, 50 bushel capacity	412	27.47	410
Cattle feed bunk, 16', heavy	297	19.80	300
Paint a sulky plow	87	5.80	85
Paint a one-car garage	159	9.27	140
Concrete hog trough, 3' long	74	4.95	75
Lace a belt, 4" wide, with leather	40	2.67	40
Learn to tie 12 knots (rope)	50	3.33	50
Make a rope splice	36	2.40	35
Cold chisel (make and temper)	57	3.80	55
Wrecking bar (make and temper)	76	5.07	75
Weld two bars (exercise)	45	3.00	45
Thread a bolt	16	1.07	15
Tin soldering iron	36	2.40	35
Make a funnel, 8" diameter	84	5.60	85

Table V (Con't)

Solder hole in a pail	18	1.20	20
Clean and oil harness, one set	91	6.07	90
Hame strap, sewed, two loops	69	4.60	70
Pair of lines, sewed, patent buckles	86	5.73	85
Tighten connecting rods, 4 cyl. car	87	5.80	85
Remove carbon, 4 cyl. engine	59	3.93	60
Grind valves, 4 cyl. motor	83	5.53	85
Adjust car brakes, 4 wheel, mech.	64	4.27	65
Put piston rings in 1 cyl. engine	83	5.53	85
Clean and adjust carburetor	47	3.13	45
Make auto stock trailer, 2-wheel	442	29.33	440
Replace mower pitman head	72	4.80	70
Renew mower ledger plates, set	99	6.60	100
Calibrate grain drill	74	4.93	75
Sharpen a cross-cut hand saw	82	5.47	80
Grind a drill bit	18	1.20	20

Table V (Con't)

Sharpen a plane blade	15	1.00	15
Sharpen a mower sickle	67	4.47	65
Make a 2-horse evener	79	5.27	80

smallest of the means). For the sake of those who prefer to deal with quantities which are more nearly "round numbers" the fourth column is arranged, arbitrarily, as a suggestion. It differs only slightly from the means in the first column.

Application of the Point System. It is recognized that data presented herein is somewhat limited, due to the fact that not many teachers of farm mechanics use the point system. It does, however, afford some specific information on a few important factors, such as, methods of keeping records, standards of requirements, and basis for allotting points.

In applying the point system it is suggested that the teacher organize his farm mechanics course into shop enterprises. Some of the enterprises may be taught as isolated units, while others will not. The relative importance of the enterprises should be established, and the number of points to be required for each, together with the total for the year, should be fixed in proportion. If the number of enterprises differs from that presented in Table IV, the suggested scale of points will need to be adjusted accordingly. The next step is to set up a list of exercises, jobs, and projects and assign a maximum number of points to each. Provisions must be made for additions to the

list, inasmuch as many new jobs will arise from time to time. Points for large projects involving work in more than one enterprise should be prorated so that the student will be enabled to meet his requirements in each enterprise. At the six-weeks, or other grading interval, the totals of points accumulated will be the basis for grades. Those above the minimum requirements may be distributed according to the group medians. It is essential, of course, that all records be kept up-to-date.

GENERAL SUMMARY AND CONCLUSIONS

Unfavorable aspects of giving and receiving grades may be reduced to the minimum by employing a testing and grading system which is, as far as possible, objective, which puts a premium upon quantity as well as upon quality of work, and which the student understands.

The survey shows that for testing farm mechanics work teachers of vocational agriculture prefer to give examinations as soon as a unit of work is finished, and that they rank their "best tests" as Performance, Completion, Discussion, Multiple Choice, True-false, and matching, in the order given. For the sake of reliability it is advised that a variety of these types be employed in making up tests

The point system is recommended as a means of making the grading more "objective" to the student, of causing the student to be more conscious of quality in his work, and of placing him largely upon his own initiative.

It is advised that a minimum number of points for the year and for each enterprise and a maximum number for each exercise, job, and project be fixed. The ratios and suggested scales, obtained from the survey data and presented in tables IV and V will serve as bases for these allotments of points.

When a student completes a piece of work the maximum number of points allotted to it should be scaled down to a degree depending upon how nearly the work approaches the ideals, subjective and objective, held by both the student and the teacher. Such a scheme does not eliminate subjective judgments, but greatly reduces them. On the whole, the point system carries several desirable features not found in other methods of grading.

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